CLAIM AMENDMENTS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims

1. (Currently Amended) A method of characterizing a content traffic flow at communication nodes of a communications network for communications network Service Level Agreement (SLA) compliance assessment by a central entity connected to said communication nodes, the method comprising ~~steps of~~:

a. at least one of said communication nodes tracking cumulative content arrivals, in real time, for the content traffic flow to derive a time variation of cumulative content arrivals;

b. said at least one of said nodes adjusting characteristic arrival curve parameters, the arrival curve parameters comprising at least a slope and an ordinate intercept, in fitting an arrival curve to the variation of cumulative content arrivals for the content traffic flow; and

c. said at least one of said nodes reporting said adjusted arrival curve parameters to said central entity to enable said central entity to carry out said SLA compliance assessment with respect to the content traffic flow, thereby reducing reporting bandwidth overhead by minimizing an amount of content arrival information communicated to said central entity.

1   2.   (Currently Amended) The method of providing a content traffic flow

2   characterization as claimed in claim 1, wherein ~~the step of~~ reporting arrival curve

3   parameters to the central entity is carried out in real time, and reporting is limited

4   to arrival curve parameters only.

1   3.   (Currently Amended) The method claimed in claim 1, ~~wherein reporting~~

2   ~~arrival curve parameters to the central entity, the method~~ further <u>comprising:</u>

3   ~~comprises a step of:~~

4   said at least one of said nodes including a timestamp specifying the time of

5   the arrival curve fit.

1   4.   (Currently Amended) The method claimed in claim 1, ~~wherein reporting~~

2   ~~arrival curve parameters to the central entity, the method~~ further <u>comprising:</u>

3   ~~comprises a step of:~~

4   said at least one of said nodes receiving a request for an arrival curve

5   parameter update[[,]]<u>;</u>

6   reporting arrival curve parameters to the central entity only in response to a

7   request<u>; and</u>

8   further providing a reduction in the reporting bandwidth overhead.

1   5.   (Currently Amended) The method claimed in claim 1, ~~wherein tracking~~

2   ~~cumulative content arrivals for the content traffic flow, the method~~ further

3   comprising:

4   ~~comprises a step of:~~

5   said at least one of said nodes tracking one of cumulative received packets,

6   bits, bytes, words, and double words.

1   6.   (Canceled)

1   7.   (Currently Amended) The method claimed in claim 1, ~~wherein adjusting~~

2   ~~arrival curve parameters in fitting the arrival curve, the method~~ further

3   comprising:

4   ~~comprises a step of:~~

5   said at least one of said nodes adjusting four arrival curve parameters in

6   fitting a four parameter arrival curve.

1   8.   (Currently Amended) The method claimed in claim 1, ~~wherein adjusting~~

2   ~~arrival curve parameters in fitting the arrival curve, the method~~ further

3   comprising:

4   ~~comprises a step of:~~

5   said at least one of said nodes fitting the arrival curve in accordance with one

6   of a shifted linear regression procedure, and a convex hull fitting procedure.

1   9-11.   (Canceled)

1   12.   (Currently Amended) A method of assessing communications network

2   conformance to a Service Level Agreement (SLA) in respect of a content traffic flow

3   at communication nodes of a communications network, the method comprising ~~steps~~

4   ~~of~~:

5   ~~a.~~ receiving from at least one of said communication nodes an arrival curve

6   parameter report in respect of a tracked content traffic flow in real time;

7   ~~b.~~ computing a resource utilization related value based on the received

8   arrival curve parameter report in respect of a content traffic flow pattern and at

9   least one service curve; and

10   ~~c.~~ providing a communications network SLA conformance assessment based

11   on the computed resource utilization related value,

12   wherein receiving arrival curve parameters<u>, the arrival curve parameters</u>

13   <u>comprising at least a slope and an ordinate intercept,</u> only enables the provision of a

14   real-time scalable communications network SLA conformance assessment solution

15   while reducing reporting bandwidth overhead by minimizing an amount of content

16   arrival information communicated by said at least one of said nodes.

1   13.   (Currently Amended) The method claimed in claim 12, further comprising:

2   ~~the prior step of:~~

3   a central entity requesting an arrival curve parameter report from said one of

4   said nodes.

1   14.   (Currently Amended) The method claimed in claim 12, ~~wherein prior to~~

2   ~~computing resource utilization related values, the method~~ further comprising:

3   ~~comprises a step of:~~

4   retrieving the at least one service curve from storage in respect of the content

5   traffic flow.

1   15.   (Currently Amended) The method claimed in claim 12, ~~wherein prior to~~

2   ~~computing resource utilization related values, the method~~ further comprising:

3   ~~comprises a step of:~~

4   retrieving the at least one service curve from said at least one node, said at

5   least one node being in a path of the content traffic flow.

1   16.   (Currently Amended) The method claimed in claim 12, ~~wherein prior to~~

2   ~~computing resource utilization related values, the method~~ further comprising:

3   ~~comprises a step of:~~

4   retrieving from storage a sequence in which multiple service curves are to be

5   combined with the arrival curve parameters in respect of the content traffic flow.

1   17.   (Currently Amended) The method claimed in claim 12, ~~wherein prior to~~

2   ~~computing resource utilization related values, the method~~ further comprising:

3   ~~comprises a step of:~~

4   discovering a sequence in which multiple service curves are to be combined

5   with the arrival curve parameters in respect of the content traffic flow.

1   18.   (Currently Amended) The method claimed in claim 12, ~~wherein computing~~

2   ~~resource utilization related values, the method~~ further comprising:

3   ~~comprises a step of:~~

4   computing Quality-of-Service (QoS) parameters.

1   19.   (Currently Amended) The method claimed in claim 12, ~~wherein computing~~

2   ~~resource utilization related values, the method~~ further comprising:

3   ~~comprises a step of:~~

4   convolving an arrival curve respecting the received arrival curve parameters

5   with a service curve.

1   20.   (Currently Amended) The method claimed in claim 12, ~~wherein providing a~~

2   ~~communications network SLA conformance assessment, the method~~ further

3   <u>comprising:</u> ~~comprises a step of:~~

4   comparing the computed resource utilization related value with a

5   corresponding agreed upon resource utilization value.

1   21.   (Currently Amended) The method claimed in claim 12, ~~wherein providing a~~

2   ~~communications network SLA conformance assessment, the method~~ further

3   <u>comprising:</u> ~~comprises a step of:~~

4   selectively modifying communications network operational parameters to

5   ensure that the resource utilization values comply with agreed upon SLA resource

6   utilization values.

1   22.   (Currently Amended) The method claimed in claim 12, ~~wherein providing a~~

2   ~~communications network SLA conformance assessment, the method~~ further

3   <u>comprising:</u> ~~comprises a step of:~~

4   selectively modifying SLA specified resource utilization values to ensure that

5   the current communications network operation is accommodated in the SLA.

1   23.   (Currently Amended) The method claimed in claim 12, ~~wherein providing a~~

2   ~~communications network SLA conformance assessment, the method~~ further

3   comprising: ~~comprises a step of:~~

4   providing a proposal for traffic content redirection onto one of existing

5   infrastructure and new to be deployed infrastructure.

1   24.   (Canceled)

1   25.   (Currently Amended) A method of centrally assessing communications

2   network conformance to a Service Level Agreement (SLA) in respect of a content

3   traffic flow at least one of a plurality of communication nodes of a communications

4   network, the method comprising ~~steps of~~:

5   ~~a.~~ said at least one communication ~~nodes~~ node tracking cumulative content

6   arrivals for the content traffic flow, in real-time, to derive a time variation of

7   cumulative content arrivals at a communications network node;

8   ~~b.~~ said at least one of said nodes adjusting arrival curve parameters, the

9   arrival curve parameters comprising at least a slope and an ordinate intercept in

10 fitting an arrival curve to the variation of cumulative content arrivals for the

11 content traffic flow;

12   ~~e.~~ said at least one node reporting, in real time, arrival curve parameters to a

13   central entity assessing communications network SLA conformance with respect to

14   the content traffic flow;

15   ~~d.~~ said central entity receiving an arrival curve parameter report in respect of

16   a tracked content traffic flow from said at least one network node in real-time;

17   ~~e.~~ computing a resource utilization related value based on the received

18   arrival curve parameter report in respect of a content traffic flow pattern and at

19   least one service curve; and

20   ~~f.~~ providing a communications network SLA conformance assessment based

21   on the computed resource utilization related value,

22   employing arrival curve parameter reporting greatly reducing resource

23   overheads in providing communications network SLA conformance assessments.

1   26.   (Currently Amended) The method claimed in claim 25, ~~wherein reporting~~

2   ~~arrival curve parameters to the central entity, the method~~ further comprising:

3   ~~comprises a step of:~~

4   said at least one of said nodes including a timestamp specifying the time of

5   the arrival curve fit.

1   27.   (Currently Amended) The method claimed in claim 26, ~~wherein reporting~~

2   ~~arrival curve parameters to the central entity, the method~~ further comprising:

3   ~~comprises a step of:~~

4   said at least one of said nodes receiving a request for an arrival curve

5   parameter update[[,]];

6   reporting arrival curve parameters to the central entity only in response to a

7   request[[,]]; and

8   further providing a reduction in the reporting bandwidth overhead.

1   28.   (Currently Amended) The method claimed in claim 25, ~~wherein tracking~~

2   ~~cumulative content arrivals for the content traffic flow, the method~~ further

3   comprising: ~~comprises a step of:~~

4   said at least one of said nodes tracking one of cumulative received packets,

5   bits, bytes, words, and double words.

1   29.   (Canceled)

1   30.   (Currently Amended) The method claimed in claim 25, ~~wherein adjusting~~

2   ~~arrival curve parameters in fitting the arrival curve, the method~~ further

3   comprising:

4   ~~comprises a step of:~~

5   said at least one of said nodes adjusting four arrival curve parameters in

6   fitting a four parameter arrival curve.

31.   (Currently Amended) The method claimed in claim 25, ~~wherein adjusting~~

~~arrival curve parameters in fitting the arrival curve, the method~~ further

comprising:

        ~~comprises a step of:~~

        said at least one of said nodes fitting the arrival curve in accordance with one

of a shifted linear regression procedure, and a convex hull fitting procedure.

32.   (Currently Amended) The method claimed in claim 25, ~~wherein prior to~~

~~receiving the arrival curve parameter report, the method~~ further comprising ~~the~~

~~prior step of~~:

        requesting an arrival curve parameter report from said at least one of said

nodes.

33.   (Currently Amended) The method claimed in claim 25, ~~wherein prior to~~

~~computing resource utilization related values, the method~~ further comprising:

~~comprises a step of:~~

        retrieving the at least one service curve from storage in respect of the content

traffic flow.

1   34.   (Currently Amended) The method claimed in claim 25, ~~wherein prior to~~

2   ~~computing resource utilization related values, the method~~ further comprising:

3   ~~comprises a step of:~~

4   retrieving the at least one service curve from said at least one node, said at

5   least one node being in a path of the content traffic flow.

1   35.   (Currently Amended) The method claimed in claim 25, ~~wherein prior to~~

2   ~~computing resource utilization related values, the method~~ further comprising:

3   ~~comprises a step of:~~

4   retrieving from storage a sequence in which multiple service curves are to be

5   combined with the arrival curve parameters in respect of the content traffic flow.

1   36.   (Currently Amended) The method claimed in claim 25, ~~wherein prior to~~

2   ~~computing resource utilization related values, the method~~ further comprising:

3   ~~comprises a step of:~~

4   discovering a sequence in which multiple service curves are to be combined

5   with the arrival curve parameters in respect of the content traffic flow.

1   37.   (Currently Amended) The method claimed in claim 25, ~~wherein computing~~

2   ~~resource utilization related values, the method~~ further comprising:

3   ~~comprises a step of:~~

4   computing Quality-of-Service (QoS) parameters.

1   38.   (Currently Amended) The method claimed in claim 25, ~~wherein computing~~

2   ~~resource utilization related values, the method~~ further comprising:

3   ~~comprises a step of:~~

4   convolving an arrival curve respecting the received arrival curve parameters

5   with a service curve.

1   39.   (Currently Amended) The method claimed in claim 25, ~~wherein providing a~~

2   ~~communications network SLA conformance assessment, the method~~ further

3   comprising: ~~comprises a step of:~~

4   comparing the computed resource utilization related value with a

5   corresponding agreed upon resource utilization value.

1   40.   (Currently Amended) The method claimed in claim 25, ~~wherein providing a~~

2   ~~communications network SLA conformance assessment, the method~~ further

3   comprising: ~~comprises a step of:~~

4   selectively modifying communications network operational parameters to

5   ensure that the resource utilization values comply with agreed upon SLA resource

6   utilization values.

1   41.   (Currently Amended) The method claimed in claim 25, ~~wherein providing a~~

2   ~~communications network SLA conformance assessment, the method~~ further

3   comprising: ~~comprises a step of:~~

4   selectively modifying SLA specified resource utilization values to ensure that

5   the current communications network operation is accommodated in the SLA.

1   42.   (Currently Amended) The method claimed in claim 25, ~~wherein providing a~~

2   ~~communications network SLA conformance assessment, the method~~ further

3   comprising: ~~comprises a step of:~~

4   providing a proposal for traffic content redirection onto one of existing

5   infrastructure and new to be deployed infrastructure.

1   43.   (Original) The method claimed in claim 25, wherein the central entity is a

2   network management system.

1   44.   (Currently Amended) The method as claimed in claim 1, wherein said

2   tracking, adjusting, and reporting ~~steps~~ are carried out by more than one of said

3   communication nodes.

1 45.   (Previously Presented) The method as claimed in claim 12, wherein said

2 arrival curve parameter report is received from more than one of said

3 communication nodes.

1 46.   (Currently Amended) The method as claimed in claim 25, wherein said

2 tracking, adjusting, and reporting ~~steps~~ are carried out by more than one of said

3 communication nodes, and said arrival curve parameter report is received from

4 more than one of said communication nodes.